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GEOLOGICAL SURVEY (OF CANADA.)

REPORT OF PROGRESS

FROM

ITS COMMENCEMENT

TO

1863.

ATLAS OF MAPS AND SECTIONS,

WITH AN INTRODUCTION AND APPENDIX.

OFFICERS OF THE SURVEY:

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1865.

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JOHN LOVELL, PRINTER, ST. NICHOLAS STREET.
1865.

ERRATA.

Page 22, 15 lines from bottom for 885 read 855.

" 31, 17 " " " " 131 " 121.

Section IV A, for *three miles to an inch* read *three inches to a mile*.

PREFACE.

THIS Atlas contains the Geological Maps and Sections intended to accompany the volume on the Geology of Canada which appeared in 1863. The materials for these were already prepared at that time; but various circumstances beyond the control of the Geological Commission have delayed until now their publication.

In the introduction will be found a sketch of the progress of topographical investigation in Canada, and a brief account of the labors of the Geological Commission in that department. The chief part of what is now known of the geography of Gaspé, and of the great region between the Ottawa and Lake Huron, is due to the topographical surveys made by the officers of the Commission. It is to the folio atlas of maps published in 1857 (see page 11), that the engineers appointed to survey the line of the projected Ottawa and Lake Huron Canal are indebted for the topography of the route from the mouth of the French River on Lake Huron to the mouth of the Mattawa. Their delineation of the Ottawa from the Mattawa to the Des Moines is also from a survey (as yet unpublished) by the Geological Commission.

In the second place will be found an account of the sources of geological information, followed on page 23 by a notice of the larger general map, and of a special map of Canadian territory, to be published on an extended scale in sections. A detailed explanation of the several maps and sections herein contained is next given.

As an appendix to this introduction, it has been thought proper to prepare a short notice of the earlier reports and other publications of the Geological Survey. This is followed by a table of the variations of the magnetic needle for various stations throughout Canada.

As regards the execution of the maps, it remains to be said that the compilation of their topographical details is the work of Mr. ROBERT BARLOW, aided by his son, Mr. SCOTT BARLOW, both of whom are now,

and have been for several years, attached to the office of the Geological Survey. These maps, with the exception of IV, were engraved on copper or on steel by Mr. A. W. GRAHAM, of this city. Of these the first three were subsequently transferred to stone, and printed in colors in the establishment of Mr. E. STANFORD, of Charing Cross, London, England, where also was engraved and printed the map IV. The map V was both engraved and printed by Mr. GRAHAM.

The twelve colored sections, which were prepared by myself, with the aid of Mr. JAMES RICHARDSON, were engraved on copper, and printed from stone, by Mr. STANFORD. The uncolored sections, six in number, are from engravings on wood by Mr. J. H. WALKER, of this city, who, as mentioned in the preface to that volume, executed most of the engravings for the Geology of Canada. The printing of these latter sections, as well as of the accompanying letter-press, is from the establishment of Mr. JOHN LOVELL, of this city, to whose skill and taste the publications of the Geological Survey are greatly indebted.

W. E. LOGAN.

Office of the Geological Survey,
MONTREAL, December, 1865.

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MAPS AND SECTIONS
TO ACCOMPANY THE
REPORT
ON THE
GEOLOGY OF CANADA.

INTRODUCTION.

PLAN OF A GENERAL GEOLOGICAL MAP; SOURCES OF TOPOGRAPHICAL INFORMATION; LABORS OF THE MESSRS. BOUCHETTE; BAYFIELD'S CHARTS; CAPTAIN ASHE'S DETERMINATIONS OF LONGITUDE; BOUNDARY COMMISSIONS; UNITED STATES TOPOGRAPHICAL ENGINEERS; U. S. COAST SURVEY; TOPOGRAPHICAL LABORS OF THE CANADIAN GEOLOGICAL SURVEY; ADDITIONAL SOURCES OF INFORMATION; FOR CANADA EAST; FOR CANADA WEST; FOR THE MARITIME PROVINCES; FOR THE UNITED STATES.

SOURCES OF GEOLOGICAL INFORMATION FOR CANADA; FOR THE OTHER BRITISH PROVINCES; FOR THE UNITED STATES; CO-OPERATION OF PROP. JAMES HALL.

GEOLOGICAL MAPS; I. GENERAL MAP; II. MAP OF LAURENTIAN ROCKS; III. MAP OF HURONIAN ROCKS; IV. MAP OF LOWER SILURIAN ROCKS NEAR LAKE CHAMPLAIN; IV^a and IV^b. FIVE SECTIONS OF THE ROCKS OF THIS REGION; V. MAP OF THE ROCKS OF THE QUEBEC GROUP AT POINT LEVIS; V^a. SECTION OF THE SAME ROCKS; VI. MAP OF THE SUPERFICIAL GEOLOGY OF CANADA.—LARGER GENERAL MAP; OTHER MAPS IN PREPARATION.—TWELVE GEOLOGICAL SECTIONS DESCRIBED.

IN presenting this Atlas of Geological Maps, which is destined to accompany the volume on the Geology of Canada published in 1863, it will be sufficient to refer the reader to that work and to its preface for an account of the sources of the geological information contained in these maps, so far as Canada is concerned. The sources from which the geology of the adjacent British provinces, and of part of the United States are derived, will be noticed in subsequent pages.

IN order to give a correct notion of the geology of the British North American provinces, of its relations to that of the adjacent parts of the continent, and especially to its great coal-bearing areas, it was thought proper to prepare a map which should embrace the whole region from the eastern extremity of Newfoundland to the Assiniboin, and from James's Bay on the north to the confines of Virginia on the south. This map, on the scale of twenty-five miles to the inch, has already been engraved in Paris, and will soon be published, giving, in different colors, the geology of the whole of this great region. Meanwhile a reduction of

General Map.

this to one fifth, or to 125 miles to the inch, also geologically colored, by chromo-lithography, has been prepared, and forms the first map of this Atlas. The present seems therefore a fitting occasion for describing the sources of topographical information resorted to in the construction of the large general map.

Topography. Many of the difficulties encountered in making a geological survey of Canada have arisen from the want of proper topographical maps, and also from the fact that great parts of the country were wholly unexplored, and consequently not represented on any map. In older countries the labors of topographers and geographers have preceded those of the geologist, and have given correct representations of the surface, rendering the subsequent geological investigation comparatively easy. But in Canada the want of such maps has compelled the geologist, in many parts of the country, to study its topography as a preliminary to the representation of its geology. Hence a great part of the labors of the Survey during the last twenty years, has been bestowed upon topographical researches, the extent and importance of which will appear from the summary to be given farther on. These additional labors, and the unwelcome task of map-making imposed upon the officers of the Survey, have been the source of great delays in the geological investigations.

**Works of the
Messrs.
Bouchette.**

Honorable mention is here due to the topographical labors of the Messrs. Bouchette. The late Mr. Joseph Bouchette, Surveyor-General of Canada, published in 1815, "A Topographical Dictionary of Lower Canada, with remarks on Upper Canada," accompanied with a general map of British North America and parts of the United States; and also a map of Lower Canada on a scale of two and a half miles to an inch. In 1831, the Surveyor-General produced his Topographical and Statistical Account of British North America, in two volumes quarto, and also a Topographical Dictionary of Lower Canada, in one volume; besides a map of Canada and the Lower Provinces, published by Wyld of London, on a scale of about three miles to an inch. His son, Mr. Joseph Bouchette, since Deputy Surveyor-General for Lower Canada, also prepared a map of the British North American Provinces, on the scale of about fourteen miles to the inch. This was published in London in 1831, but appeared in a new and revised edition at New York in 1846. These maps, especially the larger one of 1831, have been of much use in the progress of the Survey, and have served for laying down preliminary sketches of the geology of many of the older settled and better surveyed regions.

**Bayfield's Sur-
veys.**

In the absence of a regular trigonometrical survey of the province, the excellent hydrographical surveys by Admiral Bayfield of the St. Lawrence and the great lakes, published by the British Admiralty, were of the greatest value; as were also the Government surveys of the boundaries between Canada and the adjacent States. In addition to these care-

fully measured coasts and boundary-lines, which served as guides in laying down and connecting the various local surveys, it was considered desirable to fix with greater exactitude than had hitherto been done the longitude of several important points. For this purpose recourse was had to the new method introduced a few years since in the United States, by which the electric telegraph is employed. The services of Capt. E. D. Ashe, R.N. having been secured, he in 1856-57, determined in this way the relative longitudes of Quebec, Three Rivers, Montreal, Kingston, Ottawa, Toronto, Collingwood, Windsor, and Chicago, the last place with the kind assistance of Col. Graham, U. S. Engineers. In addition to these determinations of Capt. Ashe, the longitude of Fredericton, New Brunswick, had been previously fixed by Dr. Toldervey and Prof. Jack, and that of Halifax by Admiral Bayfield; in both instances by the electric method, and in relation to Cambridge. Quebec was made the point of departure for Canada, and its longitude, through the kind assistance of the late Prof. W. C. Bond, was compared with that of the Observatory at Cambridge near Boston, Massachusetts; which is the position on this continent whose relation with the Greenwich Observatory in England has been most accurately determined. The longitude of Cambridge and of the various places determined by Capt. Ashe, as compared with Greenwich, is as follows:

	°	'	"	
CAMBRIDGE, Observatory.....	71	7	40.50	W.
QUEBEC, ".....	71	12	15.30	"
THREE RIVERS, Barrack Square.....	72	32	17.70	"
MONTREAL, Viger Square.....	73	32	55.80	"
OTTAWA, Barrack Hill.....	75	42	4.35	"
KINGSTON, Court House.....	76	28	37.80	"
TORONTO, Magnetic Observatory.....	79	23	21.45	"
COLLINGWOOD, Railway Terminus.....	80	12	37.95	"
WINDSOR, Court House.....	83	2	0.30	"
CHICAGO, R. C. School, Huron Street.....	87	37	38.10	"

To Admiral Bayfield personally the Survey is moreover indebted for a list of latitudes and longitudes of places along the coasts of Labrador, Nova Scotia, New Brunswick, the islands of Newfoundland, Cape Breton, Prince Edward, Anticosti, and the Magdalen Islands; besides other places along the river St. Lawrence and the lakes Ontario, Erie, Huron, and Superior. Capt. Shortland, R.N., also furnished a similar list for the southern shores of Nova Scotia and New Brunswick. These various positions being first compared with and corrected by those determined by Capt. Ashe and others by the electric telegraph, were of the greatest assistance in laying down with accuracy the above-named coasts.

The boundary between New Brunswick and the United States, from the monument at the source of the river St. Croix to where the line joins

Boundary
Surveys.

the boundary of Canada; and from thence between Canada and the United States to St. Regis, where it meets the St. Lawrence on the parallel of 45° north latitude, has been laid down from the survey made under the Joint Commission, according to the Treaty of Washington of 1842. In this connection use was made of the tables of latitudes and longitudes, obtained from astronomical observations made by Colonel Robinson, Royal Engineers, and Colonel Graham, United States Topographical Engineers, who were attached to the Joint Commission, and their assistants.

The boundary between Canada and New Brunswick has been laid down from the plan of the survey made by the Commissioners under the Imperial Act, 14 and 15 Vic., Cap. 63; with the assistance of the latitudes and longitudes of the principal points determined by Colonel Robinson, one of the Commissioners, reduced as before to the standard of Quebec.

United States
Topographical
Engineers.

The northern part of Lake Michigan, Green Bay, the western coast of Lake Huron, parts of Lakes St. Clair and Erie, and the rivers St. Mary and Detroit, have been laid down from the charts of the North and North-west Lakes by the United States Topographical Engineers. These results were corrected by the aid of the table of geographical positions, showing the latitudes and longitudes of the most important points from Detroit, through Lake Huron, to the Beaver Islands in Lake Michigan, published by these Engineers in the report of their survey for 1860, and agreeing with the longitude of Windsor, as determined by Capt. Ashe.

The boundary between Canada and the United States from Lake Superior westward, and the lakes through which it passes from thence to the north-west angle of the Lake of the Woods, are reduced from the map of the survey made by Mr. David Thompson, by order of the Commissioners under the 6th and 7th articles of the Treaty of Ghent.

United States
Coast Survey.

The Atlantic coast and islands of the United States are laid down from the tables of latitudes and longitudes, and from the charts published in the Annual Reports of the United States Coast Survey, up to 1858, and by its superintendent, Professor A. D. Bache, kindly furnished to the Canada Geological Survey.

In addition to the above sources of information, the most authentic to be obtained, are the topographical results of the officers of the Geological Survey, which were for the most part first laid down on the scale of one inch to a mile.

Canadian Geo-
logical Survey.

In the Gaspé District the early topographical labors of Messrs. Logan and Murray, in 1844 and 1845, were devoted to a triangulation from a base line along the shore of the Gulf of St. Lawrence, and to the measurements of the rivers Chatte, Great Cascapedia, Bonaventure, Matanne, Ste. Anne, and Douglastown or St. Johns, the total measured length of which amounted to 299 miles. In 1857 and 1858 these labors were continued by Mr. Richardson, who surveyed the Magdalene, the Restigouche, the

Gaspé.

Patapedia and the Great Metis, with several tributary streams and lakes, amounting in all to about 200 miles. In 1862 Mr. Bell surveyed the Dartmouth, York, Malbay and Grand Rivers, for an aggregate distance of ^{Gaspé.} 106 miles. In connection with the surveys of these various rivers and their tributaries, numerous traverse-lines have been measured, making, with the previous distance, a total of about 700 miles; all of which was measured with a Rochon's-micrometer telescope, and laid down on a scale of one inch to a mile. In the above estimate the distances which were measured by pacing have not been included.

In 1845 Sir W. E. Logan made a topographical survey of the Ottawa ^{Upper Ottawa.} from near the Joachim Rapids to the head of Lake Temiscamang, a distance, including both shores of this lake, of 180 miles. He also measured the Mattawan and the portages to Lake Nipissing. The examination of this region was continued by Mr. Murray in 1847, and in 1853-1856; during which years he surveyed Lake Nipissing, the French River with its mouths, and a part of the shore of Lake Huron; the Sturgeon, Wahnapiatae and ^{Lake Huron.} Spanish Rivers, together with the Meganatawan, Muskoka, Petewawah, Madawaska and Bonnechère, with numerous tributary lakes and streams. The whole of these surveys, laid down on a scale of one inch to a mile, are represented in the Atlas of twenty-two folio plates, published in 1857, to accompany the Report for 1853-1856.

In 1857 and 1858, the topographical surveys of Mr. Murray were extended to the rivers Thessalon and Mississagui, to Echo Lake and River, Great and Little Lakes George, and Garden River. The whole of these investigations, from Lake Superior to the Ottawa River, including the survey of a portion of this last, involve an aggregate distance of about 3000 miles measured by the micrometer telescope; besides between 300 and 400 miles measured by pacing. To these must be added Mr. Murray's survey of about forty miles of the Kamanistiquia River in 1846, and his subsequent survey in 1852 of several rivers and lakes between Kingston and Lake Simcoe, amounting to about 400 miles.

On the north side of the Ottawa, Sir W. E. Logan, in 1858, surveyed a portion of the river Rouge and its tributary lakes; and the subsequent ^{River Rouge.} measurements by himself, and by Mr. James Lowe, of lakes, rivers and various traverse-lines in that region, partly by the micrometer telescope and partly by pacing, are equal to over 1400 miles. These, like all the preceding results, are laid down on a scale of one inch to a mile, and were used in the preparation of the appended map of the Laurentian rocks.

It is difficult to give an estimate of all the distances measured by pacing ^{Pacings.} through little known and imperfectly surveyed regions. The distances thus determined by Mr. Richardson are by him estimated at 6300 miles; and those measured by Sir Wm. Logan are probably at least equal to this in amount.

Other Surveys. To these data must be added those furnished by the various surveys of railway lines throughout Canada, numerous lines of exploration measured by Provincial Land Surveyors under the Crown Lands Department, and surveys made by order of the Board of Works; all of which have been placed at our disposal, and have greatly aided in laying down the townships in their true positions.

Numerous other sources of topographical information were made use of, including published and unpublished maps and surveys, which are indicated in the following lists:

BRITISH NORTH AMERICA.

In constructing the map of CANADA EAST:

Maps of Townships, from the Crown Lands Department.

Maps of Seigniories, from proprietors and other private sources.

Several manuscript plans of surveys made in the Eastern Townships, by the late Mr. Alphonso Wells, Provincial Land Surveyor.

Canada East.

Plans of the rivers Marguerite, Peribonka, Mistassini, and part of Choumouchouan, from surveys made by Mr. F. W. Blaiklock, P. L. S.

Plan of Lake Keepawa, from a tracing supplied by Mr. A. J. Russell, Crown Timber Agent, Ottawa.

Plan of the river Moisie, from a survey made by Mr. E. Cayley, attached to Professor Hind's Labrador expedition in 1861.

Maps of the rivers Magdalene, Matanne, Chatte, St. Anne, St. Johns, Grand Bonaventure, Grand Cascapedia, and Metis, from surveys made by or under the direction of Sir W. E. Logan, from 1844 to 1857, and the work of the Geological Commission.

The northern and unsurveyed portions of this Province have been taken from the following sources:

A manuscript map in the Crown Lands Department, prepared under the direction of the Hon. Mr. Cauchon, by Mr. Oliver Wells, P.L.S., on a scale of two miles to an inch.

Arrowsmith's map of Lower Canada and the Maritime Provinces, published in 1838.

Arrowsmith's map of British North America, published in 1850.

James's Bay and Lake Abbitibbe are from a manuscript map prepared by Mr. G. Taylor, jun., from the sketches and observations of Mr. Peter Fidler, and presented to Sir W. E. Logan by Mr. George Barnston.

The mouths of the rivers Moose, Slade, and Albany are from surveys made by Mr. Hearne in 1774.

In constructing the map of CANADA WEST :

Plans of Townships, from the Crown Lands Department.

Plan of the Saugeen Indian Reserve, by Messrs. Dennis and Boulton. Canada West.

Map of the Talbot, Brock, and London Districts, by Mr. C. Rankin, P.L.S.

Map of the Counties of Gray and Bruce, by the same.

Map of the Huron District, by Mr. Donald McDonald.

Map of the County of Oxford by Mr. W. G. Wonham, P.L.S.

Map of the County of Wellington, by Mr. E. H. Kertland, C.E. & P.L.S.

Map of the Counties of Lennox and Addington, by Mr. H. F. Walling.

Map of the Counties of Lanark and Renfrew, by Mr. George Ellis, C.E.

Sketch of the Base Line run from Lake Nipissing to Goulais Bay, Lake Superior, by Mr. A. P. Salter, P.L.S.

Sketch of the White-Fish branch of the Spanish River, by the same.

Plan of the survey of the Ottawa River, and other surveys made by order of the Board of Works.

The rivers Kamanistiquia, Echo, Thessalon, Mississagui, Spanish, French, Wahnapiatae, and their tributary lakes; the Sturgeon River, Lake Nipissing, the Mattawan River, the Ottawa from the Des Moines to Lake Temiscamang, including this lake; the rivers Meganatawan, Muskoka, Petewawah, and Bonnechère, together with the rivers Moira, Clare, and Salmon, and several lakes in their vicinity, as also the lakes in Grand Manitoulin Island, are from surveys made by the officers of the Geological Survey.

For the topography of the remaining British territory in the northwest part of the map, in addition to the Boundary Survey already mentioned, considerable information has been derived from the published map showing the region between Fort William and the Great Saskatchewan River, prepared by Mr. S. J. Dawson in 1857-8, and introducing the latitudes of several places as previously determined by Major Long. Important data were also derived from a map by Mr. David Thompson, late Surveyor to the Hudson's Bay Company. Hudson's Bay Territory.

For NEWFOUNDLAND, in addition to Bayfield's charts, use was made of Arrowsmith's map of the island, ordered to be printed by the British House of Commons, and published in 1841.

For PRINCE EDWARD'S ISLAND, besides Bayfield's charts, a map made by Mr. George Knight, Surveyor-General, in 1852, was employed.

For NOVA SCOTIA, the Admiralty charts, and a map constructed by Mr. William Mackay in 1855 were the sources of information.

For NEW BRUNSWICK, besides the Admiralty charts, there was employed a map constructed in 1859 by Mr. John Wilkinson, Civil Engineer.

UNITED STATES.

United States.

For MAINE, besides Colton's Railway and Township map of the State, topographical maps of several counties were also made use of, viz., Androscoggin, by Mr. J. Q. Page, C.E.; Piscataquis, by Mr. H. F. Walling; Sagadahoc and York, by Mr. G. J. Chase, jun.; Cumberland, by Mr. Sidney Baker, C.E.; and Kennebec, by Baker & Co.

For NEW HAMPSHIRE, besides Colton's State map, maps of Rockingham and Hillsboro' Counties by Mr. J. Chase, jun.; of Cheshire County by Mr. L. Fagan; of Merrimack County by Mr. H. F. Walling; and a map of the White Mountains by Mr. Harvey Boardman were employed.

For VERMONT, besides a State map by Mr. H. F. Walling, use was made of the county maps of Caledonia, Orleans, Essex, Chittenden, Washington, Orange, Franklin, and Grand-Isle, by the same.

For the States of CONNECTICUT and NEW YORK, maps by Mr. J. H. French, C. E., were employed, and for PENNSYLVANIA a map published by Mr. R. L. Barnes of Philadelphia; while for RHODE ISLAND, CONNECTICUT, NEW JERSEY, DELAWARE, MARYLAND, VIRGINIA, KENTUCKY, OHIO, INDIANA, and MINNESOTA, the maps published by Mr. J. H. Colton, of New York, were made use of; as was also his General Atlas, published in 1859.

A map of MICHIGAN, by Mr. John Farmer, and another published by Ensign, Bridgman, & Fanning; one of WISCONSIN, by Mr. J. A. Lapham; of ILLINOIS, by Messrs. J. M. Peck, John Messinger, and A. J. Mathewson; of MINNESOTA, by Messrs. C. Meyer & H. N. Minden; of IOWA, by Mr. Silas Chapman; of NEBRASKA, by Mr. Robert L. Ream; and one of KANSAS, by Mr. John Halsall, were employed for these States.

A map of the territory of the United States from the Mississippi to the Pacific Ocean, compiled by Mr. G. H. Warren, U. S. Topographical Engineers, 1854-5-6-7, was employed; and topographical details were also derived from a Geological map of IOWA, WISCONSIN, and MINNESOTA, constructed from observations by the U. S. Geological Corps, by Dr. David Owen and others.

The following maps of States were consulted, but not otherwise made use of:—A Map of IOWA, by Mr. Nathan H. Parker; a Sectional map of MINNESOTA, by Mr. Silas Chapman; a Map of VERMONT published by Mr. J. H. Colton.

In like manner, the following maps of portions of CANADA were consulted, but not otherwise made use of:

Map of the Counties of Leeds and Grenville, compiled by Mr. William Sherwood.

Map of the Home and Simcoe Districts, by Mr. C. Rankin, P.L.S.

Map of Niagara, Gore, and Wellington Districts, by the same.

Map of the Counties of York, Ontario, and Peel, by Messrs. John Ellis Canada.
& Co.

Map of the Counties of Wentworth, Haldimand, Welland, etc., by the
same.

Map of the County of Simcoe, by Mr. G. H. Gibbard.

Map of the Western District, by Messrs. William Ballard and Richard
Parr.

Map of the County of Hastings, by Mr. W. H. Elmer, C.E.

Manuscript map of a part of Canada West, by Mr. W. H. Tomkins.

Map of the Eastern Townships, by Mr. Alphonso Wells, P.L.S.; pub-
lished by Arrowsmith in 1842.

GEOLOGY OF THE GENERAL MAP.

In laying down the geological lines for the province of CANADA, by far Geology,
the greater part of the information was derived from the labors of the
officers of the Geological Survey. In the preface to the *Geology of*
Canada, pages ix-xii, will however be found a notice of others who have con- Canada.
tributed to our knowledge of geological distribution in Canada. Among
these, prominent mention is due to Admiral Bayfield, R.N., Dr. J. J.
Biggsby, General Baddeley, R.E., and Dr. J. W. Dawson.

For the geology of the adjacent British provinces we are indebted for
NEW BRUNSWICK to a map by the late Prof. James Robb, and also to the New Brunswick
subsequent labors of Profs. Henry Youle Hind and L. W. Bailey,* and
Messrs. Matthews and Hartt.

For NOVA SCOTIA a manuscript map by Dr. J. W. Dawson, compiled Nova Scotia.
from his own researches, and those of Messrs. R. Brown and H. Poole,
has been the source of information.

For NEWFOUNDLAND, in addition to the map published in 1831 by Newfoundland.
Prof. J. B. Jukes, use has been made of numerous details obtained by
Mr. James Richardson of the Geological Survey of Canada, who has
extended his explorations from the northern main-land to the adjacent por-
tions of the island. Other details are derived from Mr. Alex. Murray,
so long connected with the Geological Survey of Canada, and now for the
last two years employed by the Government of Newfoundland in making
a geological survey of that island.

For the geology of the western portions of British North America we
are indebted to the map by Prof. H. Y. Hind, published in 1859.

* These two gentlemen have been recently engaged in geological explorations of dif-
ferent parts of the province of New Brunswick, and both of them have during this year
(1865) published valuable reports. That of Prof. Bailey is accompanied by a colored
geological map of a portion of the province, which was not however received until the
present map was printed.

Geology.

In laying down the geology of the UNITED STATES the following sources of information were made use of.

For MAINE a manuscript map furnished by Mr. C. H. Hitchcock, 1863.

United States.

For VERMONT the map published by the geological surveyors of that State in 1861.

For MASSACHUSETTS the published map by the late Rev. Dr. Edward Hitchcock, with the author's latest manuscript corrections and additions.

For RHODE ISLAND the map of Dr. Charles T. Jackson, 1846.

For CONNECTICUT the map of Dr. James G. Percival, 1842.

For NEW YORK the map of the State geologists, Messrs. James Hall, Vanuxem, Mather, and Emmons, 1842; with some corrections from the results of examinations made by Prof. James Hall and Sir William Logan in 1864: also a map of Jefferson county by Prof. Emmons, in his report on the geology of the 2nd district of New York.

For NEW JERSEY the map by Prof. Henry Darwin Rogers, 1839.

For PENNSYLVANIA the map by Prof. H. D. Rogers, 1858.

For DELAWARE the map of Prof. James C. Booth.

For MARYLAND the map by Mr. Phillip T. Tyson, 1859.

For the portions of VIRGINIA and KENTUCKY here represented, as well as for much of the geology of the Western States, recourse was had to a map published by Prof. James Hall in 1843, in his Report on the Geology of the Fourth District of New York (see that Report, page 681). In that map he availed himself for Virginia of the labors of Prof. W. B. Rogers and Mr. Slade, and for Kentucky of those of Dr. D. D. Owen.

For OHIO, the labors of Messrs. Locke, Mather, Whittlesey, Briggs, Foster, etc. have been made use of, with further observations by Prof. Hall.

For INDIANA the labors of Dr. D. D. Owen and of Mr. Richard Owen, with revisions.

For MICHIGAN, a manuscript map of the southern peninsula, furnished by Prof. Alex. Winchell, October 1863; and for the northern peninsula a map of WISCONSIN and the adjacent States, including the whole of MICHIGAN and parts of MINNESOTA, IOWA, and ILLINOIS, compiled by Prof. James Hall from the geological surveys of the first two States, and from the labors of Messrs. Houghton, D. D. Owen, Foster and Whitney, Alexander Winchell, and himself. In addition to this there were made use of, for the four states just named, the following maps:—

For ILLINOIS, a map of the Illinois coal-field by Mr. J. G. Norwood, 1857; also a map of the lead-regions of WISCONSIN, ILLINOIS, and IOWA, by Prof. J. D. Whitney, 1862; a map of WISCONSIN, IOWA, and MINNESOTA, by Dr. David Dale Owen, 1851; a map of the eastern half of

IOWA, published by Legislative authority in 1857; a map of WISCONSIN, by Mr. J. A. Lapham, 1855; also a geological map of MINNESOTA and WISCONSIN designed to show the portions of the rock-formations concealed by the drift; by Mr. J. G. Norwood, 1858.

For MISSOURI, maps of the counties of St. Louis and Franklin by Mr. B. F. Shumard, of Marion by Prof. G. C. Swallow, and of Moniteau by Mr. F. B. Meek, all published in 1855.

A geological map of NEBRASKA, by Mr. F. V. Hayden, published in 1858, and including DAKOTAH and a part of KANZAS, was employed. It is upon the authority of Messrs. Meek and Hayden that the existence of Permian rocks in this region is recognized.

A map showing the general geological features of the regions west of the Mississippi River, compiled from the surveys of Major W. H. Emory, the Pacific Railroad surveys, and other sources, by Messrs. James Hall and J. P. Lesley was also made use of. This includes ILLINOIS, MISSOURI, KANZAS, NEBRASKA, and DAKOTAH.

According to recent observations of Prof. Hall, received too late for the present map, an area of cretaceous rocks, reposing on Laurentian gneiss, exists in south-western Minnesota to the east of the Coteau des Prairies, which itself belongs to the Huronian series.

This delineation of the geology of a portion of the United States was made with the approval of Prof. James Hall, who has freely placed all his materials at the disposal of the compiler, and aided by his intimate personal acquaintance with the geology of a great part of the region here represented.

Collaboration
of Prof. Hall.

GEOLOGICAL MAPS.

I.

A general map of CANADA and the adjacent regions, including parts of other BRITISH AMERICAN PROVINCES and of the UNITED STATES; the geology of Canada being from the results of the Canadian Geological Survey; that of the other British Provinces and of the United States compiled from various sources which have been mentioned in the preceding pages; the whole prepared by Sir W. E. Logan. General map

This map is on a scale of 125 miles to the inch, and from its small size must be regarded chiefly as an index to the larger general map on the scale of 25 miles to the inch, to the detailed maps and sections here given, and to others now in preparation. The various geological formations are

represented upon it both by colors, and by letters and Arabic numerals, as explained in the legend on the map. For convenience of reference, these explanations are here repeated.

List of formations.

28. Tertiary.			
27. Cretaceous.			
26. Trias.			
25. Permian.			
24. Upper Carboniferous limestone.		}	Carboniferous.
23. Coal measures.			
22. Bonaventure conglomerate.			
21. Lower Carboniferous limestone.			
20. Old Red sandstone.	}	Gaspé sandstones.	}
19. Chemung and Portage.			
18. Hamilton.			
17. Oriskany and Corniferous.			
16. Lower Helderberg.	}	Gaspé limestones.	}
15. Onondaga.			
14. Guelph.			}
13. Niagara.			
12. Clinton.			}
11. Medina and Oneida.			
10. Hudson River.	}	8a. Trenton group.	}
9. Utica.			
8. Trenton.			
7. Birdseye and Black River.			
6. Chazy.	}	5a. Quebec group.	}
5. Calciferous.			
4. Potsdam.			}
3. Huronian.			
2. Upper Laurentian or Labrador series.			}
1. Lower Laurentian.			
t. Greenstone.			}
g. Granite.			

It will be understood that the various superficial or post-tertiary deposits, whose distribution is given on the map VI, are not here represented. Certain lines marked by Roman numerals from I to XI indicate the lines of the sections which are described farther on. In the text of

Trenton group.

Geology of Canada the Trenton group has been made to embrace only the divisions 7 and 8 of the above table; but the distinction between these and the succeeding divisions, 9 and 10, becomes difficult in Pennsylvania; where Prof. Rogers has included in one group the Trenton, Utica, and

Hudson River formations. Hence for this portion, and for the southwestern districts of the map, we have designated as the Trenton group (8a) the series of strata which in Canada and New York are referred to the formations 7, 8, 9, and 10.

In Rogers's geological map of Pennsylvania, the Hamilton formation is united with the Chemung and Portage, while in the geological map of New York it is represented by a distinct color. In the present map, an attempt is made to define the limit between the Hamilton and the overlying formation in eastern Pennsylvania, so far as the former is of sufficient importance to be shown separately. Hamilton formation.

In the original survey of New York, the name of Catskill group was applied to a series of rocks in the southern portion of the State. As understood by Vanuxem, it included only the Chemung division of Prof. Hall, while Mather embraced not only this, but all the other strata to the base of the coal measures in the Catskill group. Prof. Hall however restricted this name to the conglomerate which, associated with shales, overlies the Chemung group, and contains remains of *Holoptychius nobilissimus*, a fossil characteristic of the so-called Old Red sandstone of England. Much that was in the map of New York represented as belonging to the Catskill group, is here joined to the Chemung, and the true Catskill group or Old Red sandstone (20 of the preceding table) occupies but a small region in southern New York. The Chemung, like the other sedimentary formations of this region, becomes thicker in its eastward extension, so that it is difficult to fix its superior limit in this direction. Catskill group.

In the Geology of Canada, page 86, it was stated that the sandstone which extends from Sault Ste. Marie westward along the southern shore of Lake Superior, should probably be referred to the Chazy formation. Prof. Hall has since arrived at the same conclusion, and also refers to this formation the St. Peters sandstone, first recognized by Owen on the St. Peters or Minnesota River, west of the Mississippi. It is probable that this Chazy sandstone is spread out in a synclinal form in the Lake Superior basin; but its exact distribution is not yet known, and it is not certain whether an outcrop of it may not extend along the north shore of Keweenaw Point; neither has the line which separates it at the western end of the lake from the underlying strata of the Quebec group yet been traced. Its limits in this direction have therefore been arbitrarily assumed. There appears to be a considerable display of rocks of the Huronian series on the south side of Lake Superior, and it is probable that the Laurentian breaks through them in several places, but the local distribution of the latter being as yet unascertained, the whole of this region is in the small map marked with the color of the younger formation. Lake Superior sandstone.
Huronian.

In the north-western part of the United States, between the parallels of 45° and 49° of latitude, and from the meridian of 94° westward to the Cretaceous, the limits assigned to the formations are in part conjectural.

New England.

Metamorphic
rocks.

It should be remarked that with the exception of the Rhode Island coal-basin, no attempt is here made to color geologically the southeastern portion of the New England States. It is probable that the highly altered rocks of that region are nothing more than the continuation of the Silurian and Devonian strata which are met with farther to the north-east; but in the present state of our knowledge it is impossible to define their boundaries. Much of what in Nova Scotia, New Brunswick, and Maine, is represented on the map as intrusive rock (chiefly granitic) probably consists of paleozoic strata altered *in situ*, as already suggested by Dawson and Hind. See the latter's Report on New Brunswick, 1865, page 50.

In the Geology of Canada, page 932, will be found a table showing the equivalent divisions of the paleozoic strata in different regions, followed by detailed explanations to which the reader is referred.

II.

Laurentian
map.

A detailed map, showing the distribution of the LAURENTIAN ROCKS in parts of the counties of Ottawa, Terrebonne, Argenteuil, and Two-Mountains; together with portions of the adjacent Lower Silurian formations. This map is from the surveys of Sir W. E. Logan, aided by Mr. James Lowe.

This map is on a scale of seven miles to the inch. The numbers and names of the formations, including the sub-divisions of the Laurentian system, are as follows:

List of form-
ations.

- | | |
|---------------------------------|---------------------|
| 9. Utica, | } Lower Silurian. |
| 8. Trenton, | |
| 7. Birdseye and Black River, | |
| 6. Chazy, | |
| 5. Calciferous, } Quebec group, | |
| 4. Potsdam, | } Upper Laurentian. |
| 3. Huronian (<i>wanting</i>). | |
| 2. Anorthosite gneiss, etc., | } Lower Laurentian. |
| g. Fourth orthoclase gneiss, | |
| f. Grenville limestone, | |
| e. Third orthoclase gneiss, | |
| 1. d. Green Lake limestone, | |
| c. Second orthoclase gneiss, | |
| b. Trembling Lake limestone, | } Intrusive. |
| a. First orthoclase gneiss, | |
| Porphyry, | |
| Syenite, | |
| Dolerite dykes, | |

III.

A detailed map, showing the distribution of the HURONIAN ROCKS between the rivers Bachewahung and Mississagui, together with portions of the adjacent Lower and Middle Silurian formations; chiefly from the surveys of Mr. Alex. Murray.

This map is on a scale of eight miles to the inch. The numbers and names of the formations, including the sub-divisions of the Huronian series, are here given.

15. Niagara.	}	Middle Silurian.	List of formations.
12. Clinton.			
11. Medina.			
10. Hudson River.			
9. Utica.			
8. Trenton.	}	Lower Silurian.	
7. Birdseye and Black River.			
6. Chazy (St. Peters sandstone).			
5. Calciferous (Upper copper-rocks).			
4. Potsdam (<i>wanting</i>).			
1. {	}	Huronian.	
l. White quartzite, chert and limestone.			
k. Yellow chert and limestone.			
i. White quartzite.			
h. Red jasper conglomerate.			
g. Red quartzite.			
f. Upper slate conglomerate.			
e. Limestone.			
d. Lower slate conglomerate.			
c. White quartzite.			
b. Green chloritic slate.			
a. Grey quartzite.			
2. Upper Laurentian (<i>wanting</i>).	}	Laurentian.	
1. Lower Laurentian.			
Greenstone.	}	Intrusive.	
Syenite.			

In addition to the above figures and letters, and the explanations written at length, the following abbreviations are used on this map :—

<i>S. st.</i> ... Sandstone.	<i>Gn.</i> Gneiss.	Abbreviations.
<i>L. st.</i> ... Limestone.	<i>Gra.</i> Granite.	
<i>Sl. & qu.</i> ... Slate and quartzite.	<i>Sy.</i> Syenite.	
<i>Sl. con.</i> ... Slate conglomerate.	<i>R.</i> Red.	
<i>R. J. C.</i> ... Red jasper conglomerate.	<i>Gr.</i> Green.	
<i>Chl.</i> Chloritic.	<i>Hor</i> ^l Horizontal.	
<i>Amyg.</i> ... Amygdaloid.	\equiv Ice-grooves.	
<i>Gr.</i> Greenstone.	$\frac{?}{\delta}$ Copper veins.	

IV.

Lower Silurian map. A detailed map showing the distribution of rocks belonging to the Potsdam, Quebec and Trenton groups on the east side of Lake Champlain, from Stanbridge, Canada East, to St. Albans, Vermont; on a scale of two miles to an inch, from a survey by Sir W. E. Logan.

As the formations on this map are few in number, and are not represented by letters, the legend explaining the map is not repeated here.

Sections. The Geology of Canada contains five sections of this highly disturbed region, which for convenience of reference are here given as a supplement to the map. They are all upon a horizontal and vertical scale of three inches to a mile, and are as follows, commencing with the most northern. The number of the figure, and the page at which it may be found in the Geology of Canada, are given after each :

IV^a.

1. Section on the twenty-ninth lot of St. Armand, Canada East, (figure 443, page 852.)

2. Section on the boundary between Canada and Vermont, eastward from Lake Champlain, (figure 442, page 847.)

IV^b.

3. Section at Highgate Springs, Vermont, (figure 444, page 885.)

4. Section near Swanton Falls, Vermont, (figure 446, page 857.)

5. Section at Smith's lime-works in Swanton, south of the last, and near the line of St. Albans, (figure 445, page 855.)

Farther descriptions are given under each section. The numbers there used refer to the pages in the Report, where the rocks of these sections are described in detail.

V.

Point Levis. An uncolored map representing in detail the distribution of the limestones of the Quebec group at Point Levis, from a survey by Sir W. E. Logan.

This map is on the scale of a mile to three inches. The black lines represent the limestone bands actually traced; the dotted lines indicate the parts where the existence or the horizon of these bands is inferred.

The relations of these limestone bands, and the fossils which severally characterise them are noticed in detail in the Geology of Canada, page 861 and the succeeding pages.

V^A

A section of the rocks represented in map V, on a scale of a mile to three inches both vertical and horizontal. The legend appended to this section serves to explain the relation of these beds at Point Levis to the divisions of the Quebec group as given at page 227 of the Geology of Canada.

VI.

A map showing the distribution of the superficial or post-tertiary deposits between Lake Superior and Gaspé, compiled by Prof. Robert Bell. Superficial geology.

This, like the general map, is on a scale of 125 miles to the inch. It is confessedly very imperfect, being only a first attempt to represent, so far as yet known, the distribution of the superficial deposits of the champaign region of Canada. The following are the names of the sub-divisions, and the figures and letters by which they are designated on the map.

CANADA EAST.

- 2 { St. Maurice and Sorel sands.
- { Montreal Saxicava sand.
- { Upper sand of Beauport.
- 1 Leda clay.

List of formations.

CANADA WEST.

- 2 { d. Lacustrine clay and sand.
- { c. Saugeen freshwater clay and sand.
- { b Artemisia gravel.
- { a. Algoma sand.
- 1 Erie clay.

The engraving and lettering of the General Map on the scale of twenty-five miles to the inch, (which is referred to on page 9, and of which the first map in the present Atlas is a reduction to one-fifth,) is now completed, and the geological lines are being transferred to the plates. The coloring of this map will be done by hand, and copies of it will probably be ready for delivery some time in the course of 1866. Large general map.

It is now the intention of the Geological Survey to publish in successive portions a Geological Map of the Province of Canada on a scale of four miles to an inch. Such a map of the Canadian territory south of the St. Lawrence, from a meridian somewhat east of Quebec to another a Map of Eastern Townships.

little west of Montreal, is now prepared, and already partly engraved. Another similar map, including the region to the west of the last as far as the meridian of Bowmanville, and extending northward nearly to the 48th parallel of latitude is in preparation, and it is proposed that these shall in due time be followed by similar maps of other portions of the Province.

GEOLOGICAL SECTIONS.

Colored sections.

The colored sections illustrating the Geology of Canada and the adjacent States occupy four plates, and are twelve in number, embracing an aggregate length of 1,851 miles.

All of these sections are on a horizontal scale of five miles to an inch. The vertical scale is also as nearly as possible the same, although in some parts there is a slight and unavoidable exaggeration. The figures, letters and colors made use of in designating the formations in these sections are the same as those employed in the maps. On the General Map the lines of all these sections are indicated by Roman numerals corresponding to the Arabic numerals by which they are designated in the following brief description of the several sections, and in the accompanying plates :—

PLATE 1.

Section 1.

SECTION 1 is from the Laurentian on Echo River, near the outlet of Lake Superior, southward across the various sub-divisions of the Huronian series, and thence across the whole paleozoic series as far as the coal measures on Saginaw Bay, Michigan ; being a distance of 203 miles.

Section 1A.

SECTION 1^A is from a supposed fault bringing up the Laurentian gneiss on Little White River, southward across a portion of the Huronian rocks, to another fault at the mouth of Blind River on Lake Huron, again bringing up the Laurentian group ; embracing a distance of 29 miles.

In the legends of these two sections the letters refer to the sub-divisions of the Huronian as indicated on the detailed map of this series, where the line of 1^A, and that of a part of 1, is represented more distinctly than on the general map.

PLATE 2.

Section 2.

SECTION 2 is from Somerville on the Laurentian rocks to the north-east of Toronto, southward across the Lower Silurian rocks, to Lake Ontario ; then south of the lake, a little to the east of Niagara Falls, over the higher paleozoic rocks of western New York and Pennsylvania, including the coal measures, to the Nittany valley in Clinton county in that

state ; where an undulation brings the Quebec group to the surface. The portion within the state of Pennsylvania is taken from a section by Prof. H. D. Rogers. The total distance is 262 miles.

SECTION 3 is from the Laurentian in Eardley, on the north side of the Ottawa River, southward across portions of Lower Silurian rocks till the line crosses the St. Lawrence at the Thousand Islands, and passing through the eastern part of Lake Ontario, reaches the Middle Silurian strata in Oswego county, New York ; the distance being 158 miles. Section 3.

PLATE 3.

SECTION 4 is from the Laurentian in Buckingham, on the north side of the Ottawa, southeastward across the Lower Silurian strata to East Pierrepoint, St. Lawrence county, New York, where the Laurentian re-appears, —a distance of 85 miles. Section 4.

SECTION 5 is from the Laurentian in Chatham, on the north side of the Ottawa, southeastward across the Lake of Two Mountains and Lake St. Francis, to the Laurentian at Chateaugay Four-Corners, Franklin county, New York ; traversing portions of Lower Silurian formations, and the intrusive diorite of Rigaud Mountain. The distance is 60 miles. Section 5.

SECTION 6 is from the western boundary of the Petite Nation seigniory, on the north side of the Ottawa, eastward across Grenville and Chatham to St. Jerome, crossing both the Lower and Upper Laurentian formations, and the intrusive syenite and porphyry ; thence southeastward across the Lower Silurian formations, and the intrusive dolerite of Mount Royal to Laprairie, and on by Stanbridge to the province line ; showing at St. Armand, near Missisquoi Bay, the faults in the strata which are represented in the map IV. The whole distance is 126 miles, of which the first 55 miles are best seen on the detailed map of the Laurentian rocks. Section 6.

SECTION 7.—From the Upper Laurentian or Labrador series in Mille Isles, near St. Jerome in the last section, the line of this one passes in an east-southeast direction across the Lower Silurian rocks of the island of Montreal, the dolerite of Boucherville, the diorite of Belœil, the dolerite of Rougemont, and the trachyte and diorite of Yamaska, to the granitoid trachyte of Shefford—all five of these being intrusive mountain masses. Between Yamaska and Shefford Mountains is shown a highly contorted portion of the Quebec group, in which the Sillery sandstone appears. The length of this section is 76 miles. Section 7.

PLATE 4.

SECTION 8 is from the Laurentian at Shawenegan near Three Rivers, southeastward across the St. Lawrence to Tingwick in the Eastern Town- Section 8.

ships ; exhibiting the Lower and Middle Silurian formations, and showing near the River Becancour, a great dislocation, by which, for the remainder of the section, the rocks of the Quebec group, in a disturbed attitude, are kept at the surface across the Leeds and Farnham synclinal, the Bayer and Stanbridge anticlinal, and the Shipton and Leeds synclinal. The length of this section is 74 miles.

Section 9.

SECTION 9 is from the Laurentian at Bourg-Louis, a little to the southwest of Quebec, and runs southeastward across portions of Lower Silurian to a fault at Pointe aux Trembles, which brings down the summit of the Lower Silurian against the Laurentian ; thence to Tilly, on the south side of the St. Lawrence, where another fault brings up the strata of the Quebec group. From this point the section exhibits the rocks in a disturbed condition across the Lauzon and Farnham synclinal, and the Bayer and Stanbridge anticlinal to St. Etienne,—a total distance of 49 miles.

Section 10.

SECTION 10.—This line extends from Ste. Anne des Monts, on the south bank of the Gulf of St. Lawrence, in a south-southeast direction across the peninsula of Gaspé, to the mouth of the Great Cascapedia River on the Bay of Chaleurs. Commencing with the Quebec group, it crosses the Shickshock Mountains, which are formed of altered Sillery rocks, and the Barn-shaped Mountain, an intrusive mass of trachytic granite. It then traverses a great breadth of Upper Silurian, which rests unconformably upon the Quebec rocks ; and presents two subordinate basins, in both of which appears the great Gaspé sandstone formation, of Devonian age. This, in the southern basin, on the Bay of Chaleurs, is seen to be unconformably overlaid by the Bonaventure formation belonging to the Carboniferous period. The whole length is 68 miles.

Section 11.

SECTION 11.—This line from the Laurentian of the main land to the north of the Mingan Islands, on the north shore of the Gulf of St. Lawrence, passes southeast across the water of the gulf to Anticosti, thence southwest across this island to Gaspé Bay, and finally south to Cape d'Espoir on the Bay of Chaleurs ; showing portions of the Lower Silurian rocks in the Mingan Islands, it exhibits the Middle Silurian in Anticosti, and the rocks of the Quebec group brought up by a fault near Cape Rosier in Gaspé. Reposing unconformably upon these, we have, as in the last section, a great basin of the Gaspé limestones and sandstones, exhibiting several faults and undulations, and holding in two of the subordinate basins portions of the unconformable Bonaventure conglomerate. The length of this section is 161 miles.

A P P E N D I X

CONTAINING

I.

A list of the publications of the Geological Survey of Canada—including
Reports of Progress and Contributions to Paleontology.

II.

A table of the Variations of the Magnetic Needle for various stations in
British North America in the year 1856.

REPORTS OF PROGRESS OF THE GEOLOGICAL SURVEY.

For the last twenty years a succession of Reports with the above title, has been published, amounting in all to 2,248 pages 8vo. ; illustrated with numerous wood-cuts, fifteen sections and maps, and a folio Atlas of twenty-two sheets. In these Reports the results of the preceding year's investigations in Geology, Mineralogy and Palæontology will be found, together with much detailed information as to the Economic Minerals of the Province, and to the Topography, Geography, Soil, Agriculture and Natural History of the districts explored. In the large 8vo. volume on the Geology of Canada will be found condensed the information contained in these Reports, so far as the geology, mineralogy and economic minerals of the country are concerned, but for all the other subjects the Reports are still important, and often are the only available sources of information on the regions examined. These Reports were published both in the Journals of the House of Assembly of the Canadian Parliament, and separately in a demi-octavo form, but are now for the greater part out of print. They have all been translated and published in French as well as in English. In order to preserve a record of them, and to furnish a guide to the student, it is thought desirable to give a brief analysis of the several Reports.

Reports of
Progress.

I.

REPORT presented to the Government Jan. 27, 1845, and published the same year. It contains : 1. Preliminary Report in 1842 on the Geology of the Province, by Mr. W. E. Logan. 2. Report for 1843, by the same, giving a general notion of the geology of both Eastern and Western Canada so far as then ascertained. 3. Report by Mr. Alex. Murray, on the geology of parts of the champaign region of Western Canada. 4. Appendix of sixty-seven pages, being a section of the Nova Scotia coal-measures, taken at the Joggins ; the whole with ten wood-cuts.—159 pages.

II.

REPORT for 1844, presented to the Government May 1, 1845, and published in 1846. It contains Mr. W. E. Logan's topographical surveys of the Chate and Great Cascapedia Rivers, and Mr. Alex. Murray's of the Bonaventure River ; with a first account of the geology of a large part of the peninsula of Gaspé. An Appendix of thirty-three pages contains a section of the coal measures on the south side of the Bay of Chaleurs in New Brunswick, and various detailed sections of the Gaspé sandstones.—110 pages.

III.

1845. REPORT for 1845, presented to the Government May 1, 1846, and published in 1847. This contains: 1. Mr. W. E. Logan's surveys of the Ottawa River and Lake Temiscamang, with various topographical details; and a description of the geology of the Ottawa valley, and its economic minerals. 2. Mr. Alex. Murray's topographical surveys of the rivers Matanne, Ste. Anne and St. John, with details of the geology of Gaspé. 3. Appendix, containing notes by Mr. T. Sterry Hunt on some ores and mineral waters.—125 pages.

IV.

1846. REPORT for 1846, presented to the Government May 1, 1847, and published the same year. It contains: 1. A geological description of the north shore of Lake Superior by Mr. W. E. Logan. 2. Mr. Alexander Murray's topographical surveys of the Kamanistiquia and Michipicoten Rivers, with geological details. 3. Appendix containing statistics of copper-mining and copper-smelting in Great Britain.—66 pages.

In this connection may be mentioned a pamphlet published in 1847, containing two special Reports on the mining region of Lake Superior, addressed by Mr. W. E. Logan, the one to the Legislative Council, and the other to the Commissioner of Crown Lands.—81 pages.

V.

1847. REPORT for 1847, presented to the Government May 1, 1848, and published in 1849. It contains—1. A geological and mineralogical description of the Eastern Townships by Mr. W. E. Logan. 2. Mr. Murray's topographical surveys of the French River and parts of the adjacent region, with geological details. 3. Mr. T. Sterry Hunt's descriptions and analyses of various minerals, ores and mineral waters.—165 pages.

VI.

1848. REPORT of a geological exploration of part of the north shore of Lake Huron, made by Mr. W. E. Logan, in 1848; presented to the Government June 17, 1849, and published the same year; embracing a special examination of the Bruce Mines, with two maps of the mines and their vicinity.—51 pages.

VII.

1848. REPORT for 1848, presented to the Government May 1, 1849, and published in 1850, containing: 1. Mr. A. Murray's topographical survey of the Spanish River; with geological details of its vicinity, and also of the Western and Huron districts. 2. Mr. T. Sterry Hunt's examinations of various minerals and mineral springs.—65 pages.

VIII.

REPORT for 1849, presented to the Government May 1, 1850, and 1849. published the same year. It contains: 1. Mr. W. E. Logan's geological examination of St. Paul and Murray Bays, and of portions of the south side of the St. Lawrence. 2. Mr. T. Sterry Hunt's analyses of various soils, mineral waters, and ores. 3. Catalogue of the economic minerals of Canada.—115 pages.

IX.

REPORT for 1850, presented to the Government August 20, 1851, 1850. and published in 1852. It contained: 1. Mr. W. E. Logan's report on the gold of Eastern Canada (already described in the two previous reports.) 2. Mr. A. Murray's geological examination of parts of the Western Peninsula. 3. Mr. T. Sterry Hunt's examination of various minerals and mineral waters.—54 pages.

X.

REPORT for 1851, presented to the Government May 14, 1852, and 1851. published the same year. It contains: 1. Mr. W. E. Logan's description of the geology of the counties of Beauharnois and Lake of the Two Mountains. 2. A notice of the London International Exhibition of 1851, and of the Canadian minerals there exhibited. 3. Mr. A. Murray's description of the geology of the region between the St. Lawrence and Ottawa rivers. 4. Mr. T. Sterry Hunt's analyses of rocks, soils, minerals and mineral waters.—131 pages.

XI.

REPORT for 1852, presented to the Government May 1, 1853, and 1852. published in 1854. It contains: 1. Mr. W. E. Logan's geological description of the north shore of the St. Lawrence between Montreal and Quebec, with numerous details of economic materials. 2. Mr. A. Murray's topographical surveys of various rivers and lakes between Kingston and Lake Simcoe, with geological descriptions. 3. Mr. T. Sterry Hunt's classification and analyses of mineral waters, with examinations of various minerals, ores, &c.—179 pages.

XII.

REPORT for the years 1853, 1854, 1855, and 1856, presented to the 1853-56. Government in March 1857, and published the same year. It contains: 1. A description by Sir W. E. Logan of the Laurentian rocks of the Ottawa, and remarks on the preparation of a geological map of Canada. 2. Mr. A. Murray's topographical surveys in 1853, of the Muskoka, Petewawah, Bonnechère, and Madawaska Rivers, with geological details. 3. Mr. A.

1853-56. Murray's topographical surveys, in 1854, of the Meganatawan River and part of Lake Nipissing, with geological descriptions. 4. Mr. Murray's labors in 1855, including the geological examination of some parts of Western Canada; with his topographical surveys of Lake Nipissing and the south channel of the French River. 5. Mr. Murray's explorations for 1856, being topographical surveys of the north and middle channels of the French River, and of the Maskanongi, and Wahnapiæ Rivers, with geological details. 6. Mr. James Richardson's exploration in 1856, of the Island of Anticosti. 7. Mr. Billings's report for 1856, on the arrangement and classification of the Geological Museum, with numerous descriptions of new fossils. 8. Report of Mr. T. Sterry Hunt for 1853 on mineral waters and their geological relations. 9. For 1854, analyses of various rocks. 10. For 1855, on iron-working, salts from sea-water, magnesian mortars, plumbago, peat and its uses, asphalt, etc. 11. For 1856, on Silurian and Laurentian rocks, with numerous analyses, researches on metamorphism, and on dolomites, ophiolites, trachytes, etc.—494 pages.

This volume contains (1) a map illustrating Sir W. E. Logan's report on the distribution of the Laurentian limestones; (2 and 3) two reduced maps of Mr. Murray's surveys; and (4) one of Anticosti, explaining Mr. Atlas. Richardson's report. It is also accompanied by a folio Atlas, containing twenty sheets by Mr. Murray, and two by Sir W. E. Logan, embracing the results of their surveys of the region between Lake Huron and the Ottawa River. These maps, on a scale of one inch to a mile, are lithographed on sheets of twenty-two by thirty-three inches.

XIII.

1857. REPORT for 1857, presented to the Government March 31, 1858, and published the same year. It contains: 1. Sir W. E. Logan's report on the various labors of the Survey. 2. Mr. Murray's topographical surveys of the mouths of the French River, and of Echo Lake and its vicinity, with geological descriptions. 3. Mr. James Richardson's topographical surveys of the Magdalene River, etc., with geological details, and his examination of Lake St. John. 4. Mr. R. Bell's notes on the natural history of the Lower St. Lawrence. 5. Prof. James Hall's report on Canadian graptolites. 6. Mr. Billings's report on organic remains, with twenty-four wood cuts. 7. Mr. T. Sterry Hunt's report on dolomites, and on fish-manures, etc. 8. Capt. E. D. Ashe's report on telegraphic determinations of longitude.—240 pages.

This volume contains the following illustrations: 1. Geological map of the Huronian limestones. 2. Sections of the Grand Etang and the Magdalene River. 3. Geological map of part of Gaspé. 4. Plan of the Magdalene River. 5. Geological map of Lake St. John.

XIV.

REPORT for 1858, presented to the Government May 1, 1859, and 1868. published the same year. It contains: 1. Sir W. E. Logan's topographical survey of the River Rouge, with descriptions of the Laurentian limestones, and details of economic minerals—especially lead and copper ores. 2. Mr. Murray's topographical surveys of the Thessalon and Mississagui Rivers, with geological details. 3. Mr. James Richardson's topographical surveys of the Marsouin, Great Metis, Patapedia, and Restigouche Rivers, with geological descriptions. 4. Mr. T. Sterry Hunt's investigations of various intrusive rocks, and farther remarks on the origin of dolomites, etc.

To this is added an appendix, containing: 1. Levels of the River Rouge and its tributary lakes. 2. Localities of copper in Eastern Townships. 3. Localities of copper on the Mississagui. 4. Catalogue of animals and plants collected by Mr. D'Urban in the counties of Argen-teuil and Ottawa. 5. A similar catalogue by Mr. Bell for the south shore of the Lower St. Lawrence.—263 pages.

This volume contains the following illustrations: 1. A map of the Laurentian limestones. 2. A section of the Thessalon trough. 3. A map of Huronian rocks. 4. Geological map of a part of Gaspé.

XV.

The GENERAL REPORT, published in 1863, under the title of the 1863. GEOLOGY OF CANADA, (royal octavo, xxvii, and 983 pages; with 498 wood- General Report. cuts,) embraces the results of all explorations between that date and the publication of the Report for 1858. The present Atlas of Maps and Sections is intended to accompany this volume.

ESQUISSE GÉOLOGIQUE. Here may be mentioned a little essay in Esquisse Géo- French of 100 pages duodecimo, published at Paris in 1855, with the logique. title of ESQUISSE GEOLOGIQUE DU CANADA, and accompanied with a geological map of British North America, lithographed and printed in colors, on a scale of about 150 miles to the inch. This sketch and map were prepared to illustrate a large manuscript geological map and an extensive collection of rocks and minerals, which were exhibited by the Geological Survey of Canada at the Exposition Universelle, at Paris in 1855.

The DESCRIPTIVE CATALOGUE of the collection of Economic Minerals and Crystalline Rocks of Canada, sent by the Geological Survey to the London Descriptive Ca- International Exhibition of 1862, was published at Montreal, as a pamphlet talogue. of eighty-eight pages, royal octavo. It embodies much information about the Economic Geology and the Lithology of the Province; which will, however, be found in more detail in the GEOLOGY OF CANADA.

CONTRIBUTIONS TO PALÆONTOLOGY.

Besides the descriptions of organic remains noticed above, in Reports XII and XIII, and the Catalogue of Lower Silurian Fossils appended to the GEOLOGY OF CANADA; which contains moreover nearly five hundred figures of Canadian species, we may mention the Palæontological Memoirs, published in royal octavo form, by the Geological Survey, under the title of DECADES OF CANADIAN ORGANIC REMAINS. The name of decade was given to these because they were intended to contain no more than ten plates each, after the manner of the publications of the Geological Survey of Great Britain; but this limitation was afterwards abandoned, and the four parts which have been published contain in all fifty-four engraved and lithographed plates, besides numerous wood-cuts. The first published was Decade III, which appeared in 1858, and was followed in 1859 by Decades I and IV. Decade II was only published in 1865. The contents of these publications are as follows:

I.

- Decade I. Descriptions of twenty-nine species of Lower Silurian Fossils, by Mr. J. W. Salter, with forty-seven pages of text, and ten steel plates.

II.

- Decade II. A Monograph of the Graptolitidæ of the Quebec group, by Prof. James Hall; with 157 pages of text, numerous wood-cuts and twenty-three plates; of which two are lithographed, and the remainder engraved on steel.

III.

- Decade III. This decade contains, 1, Monographs of Lower Silurian Cystidæ and Asteridæ, by Mr. E. Billings. 2. A description of the genus *Cyclocystoides*, by Messrs. J. W. Salter and E. Billings. 3. A Monograph of the Palæozoic Bivalve Entomostraca of Canada, by Prof. T. Rupert Jones. The whole with 102 pages of text, numerous wood-cuts, and eleven lithographed plates.

IV.

- Decade IV. A Monograph of the Lower Silurian Crinoidea, by Mr. E. Billings, with seventy-two pages of text, numerous wood-cuts, and ten lithographed plates.

Under the name of PALÆOZOIC FOSSILS, by Mr. E. Billings, a volume of 426 pages royal octavo, with 401 wood-cuts, has just been published (1865). It contains descriptions of 443 new species, with re-descriptions or farther details of about fifty others previously published in the Reports of the Survey or in the scientific periodicals of the province.

II.

VARIATIONS OF THE MAGNETIC NEEDLE.

VARIATIONS OF THE MAGNETIC NEEDLE.

IN THE YEAR 1856.

The following table gives the variations from True North, of the Magnetic Needle, at various points in Canada, and in other parts of British North America. The greater number of these determinations are taken from the Admiralty charts, prepared by Admiral Bayfield, R. N. In his chart of the Gulf of St. Lawrence, published in 1857, the variations are calculated for the year 1856, and the determinations from other sources have been approximated to the same date. The latitude and longitude are given in the first and second columns—commencing with the most eastern points, and arranging those on the same meridian from the south northwards. The third column gives the amount of variation to the east or the west, and the fourth, the authority. The determinations of the Provincial Land Surveyors are referred to the Crown Lands' Department, from which they were received, except in a few cases, where the name of the observer is known to us.

LATITUDE.	LONGITUDE.	VARIATION.	AUTHORITY.
46°40'	52°40'	29° 0' West.	Admiral Bayfield, R. N.
48° 0'	52°40'	31° 0' "	" "
48°35'	52°40'	32° 0' "	" "
49°10'	52°40'	33° 0' "	" "
49°40'	52°40'	34° 0' "	" "
50°10'	52°40'	35° 0' "	" "
50°45'	52°40'	36° 0' "	" "
51°16'	52°40'	37° 0' "	" "
46°20'	53°45'	28° 0' "	" "
51° 0'	54° 0'	36° 0' "	" "
46° 0'	55° 0'	27° 0' "	" "
50° 0'	55° 0'	34° 0' "	" "
50°40'	55° 0'	35° 0' "	" "
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47° 5'	61°20'	25° 0' "	" "
49°40'	61°27'	29° 0' "	" "
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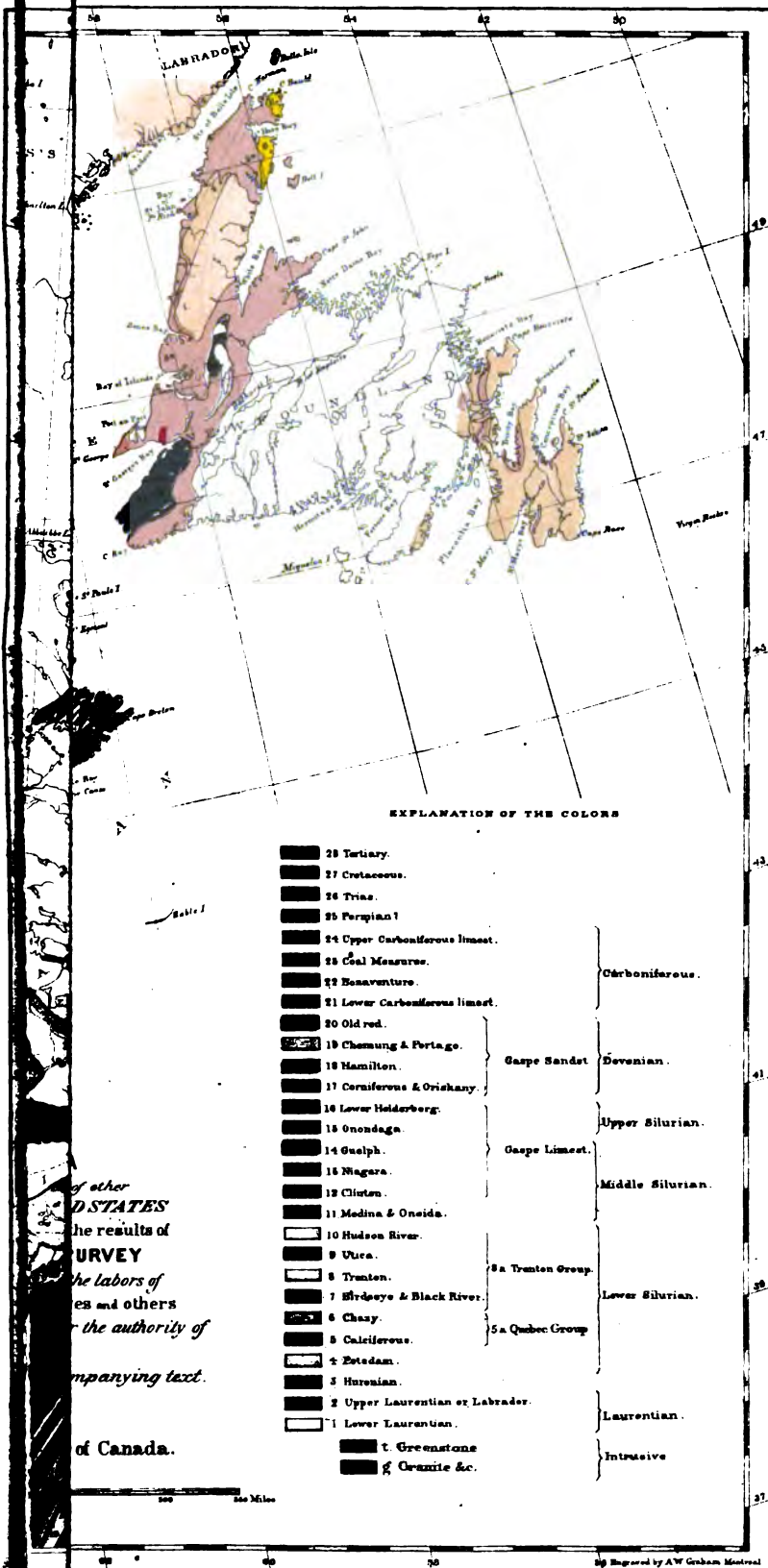
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50° 4'	64°45'	27° 0' "	" "
49°45'	65°25'	26° 0' "	" "
49°34'	66°25'	25° 0' "	" "
48° 0'	66°54'	21° 0' "	Boundary Survey, Canada & N. Brunswick.
47°54'	66°57'	21° 0' "	" " " "
49°15'	67°12'	24° 0' "	Admiral Bayfield.
49° 7'	67°24'	24°13' "	" "
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47°18'	68°29'	18°34' "	Boundary Survey, Canada and U. States.
48°46'	68°30'	21°58' "	Admiral Bayfield.
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47°21'	68°48'	18°24' "	Boundary Survey, Canada and U. States.
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47°18'	69° 3'	19°09' "	Boundary Survey, Canada and U. States.
47°27'	69°14'	18°54' "	" " " "
48°14'	69°23'	19°58' "	Admiral Bayfield.
48° 8'	69°33'	19°34' "	" "
48° 0'	69°40'	19° 9' "	" "
47°48'	69°43'	18°54' "	" "
47°27'	69°45'	17°37' "	Crown Lands' Department.
47°49'	69°52'	18°34' "	Admiral Bayfield.
48° 3'	70° 0'	19°13' "	" "
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46°42'	70° 0'	17°04' "	Boundary Survey, Canada and U. States.
46°22'	70° 7'	15°42' "	" " " "
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47°48'	70°13'	17°54' "	Admiral Bayfield.
46° 6'	70°15'	15°52' "	Boundary Survey, Canada and U. States.
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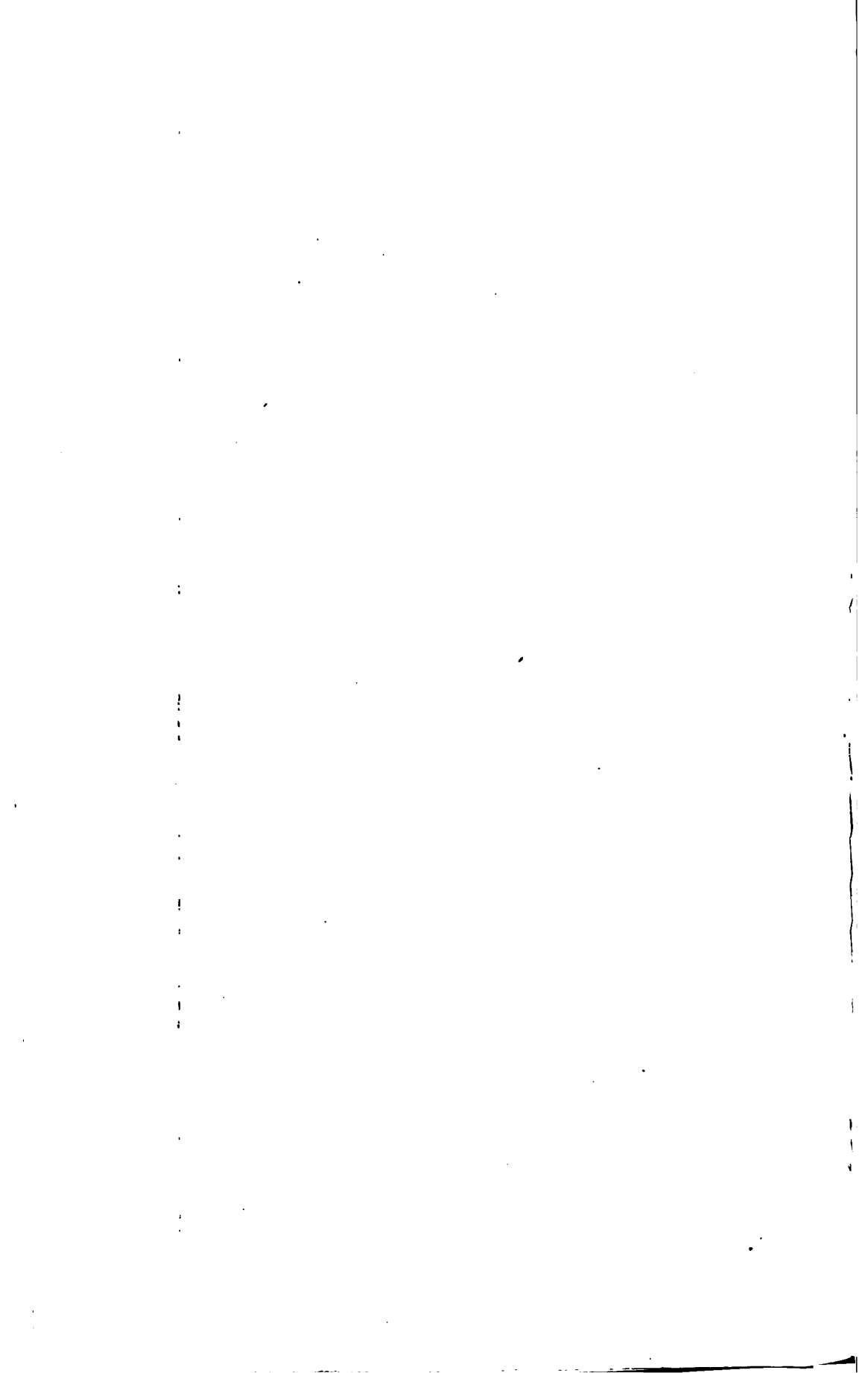
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46°47'	71°18'	15°39' "	Admiral Bayfield.
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45° 3'	71°30'	12°52' "	" " " "
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46°42'	71°43'	14°54' "	Admiral Bayfield.
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45°52'	73°11'	10°13' "	" "
45°40'	73°33'	9°28' "	" "
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45°25'	73°58'	11°28' "	" " "
45°15'	74° 8'	10° 8' "	Crown Lands' Department.
45°38'	74°39'	9°22' "	Mr. Murray, Geological Survey.
45° 0'	74°40'	9°18' "	Boundary Survey, Canada and U. States.
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45°45'	75° 8'	6°46' "	" " "
45°33'	75°21'	9° 3' "	Mr. Murray, Geological Survey.
44°35'	75°46'	5° 0' "	Capt. Owen, R. N.
46°36'	75°50'	9°18' "	Crown Lands' Department.
44°17'	75°54'	4°50' "	Capt. Owen, R. N.
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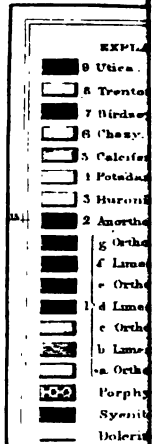
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44°40'	77°35'	5°28' "	" " "
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45°18'	78°10'	6° 0' "	" " "
44°23'	78°10'	4° 4' "	" " "
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44°30'	78°40'	2°57' "	" " "
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44°13'	78°46'	0°52' "	" " "
44°42'	78°52'	5°56' "	" " "
42°55'	78°55'	2° 4' "	Admiral Bayfield.
43°36'	78°56'	2°36' "	Capt. Owen, R. N.
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46° 0'	81° 8'	2°30' "	Mr. Salter, P. L. S.

LATITUDE.	LONGITUDE.	VARIATION.	AUTHORITY.
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42°45'	82°30'	0°38' "	Crown Lands' Department.
41°25'	82°33'	1°26' "	Lake Survey, United States.
46°11'	82°38'	1°15' West.	Mr. Salter, P. L. S.
46°32'	82°38'	1°20' "	" "
42°24'	82°40'	0°28' East.	Admiral Bayfield.
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41°49'	82°50'	1°42' "	Lake Survey, United States.
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46°31'	83° 0'	0°30' "	" "
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41°45'	83°16'	1°35' "	Lake Survey, United States.
46°14'	83°22'	1°50' West.	Mr. Salter, P. L. S.
46°31'	83°22'	1° 0' "	" "
44°14'	83°30'	1°45' East.	Lake Survey, United States.
46°26'	83°45'	1° 2' West.	Mr. Salter, P. L. S.

LATITUDE.	LONGITUDE.	VARIATION.	AUTHORITY.
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46° 2'	83°49'	1°31' West.	Lake Survey, United States.
45°50'	84° 4'	1°33' East.	" " " "
46°20'	84° 5'	0° 3' "	" " " "
46°42'	84°10'	0°20' "	" " " "
46°31'	84°21'	0°20' West.	Mr. Murray, Geological Survey.
46°50'	84°39'	0°35' East.	Admiral Bayfield.
47°20'	84°45'	1°20' "	" "
47°30'	84°53'	0° 1' West.	" "
47°58'	84°55'	2°25' East.	" "
45°46'	85° 0'	2° 0' "	Lake Survey, United States.
47°35'	85° 1'	1°58' "	Admiral Bayfield.
47°22'	85°48'	3°47' "	" "
48° 6'	86° 0'	2°59' "	" "
48°16'	86° 4'	3°16' "	" "
48°30'	86° 9'	2° 9' "	" "
48°35'	86°11'	2°22' "	" "
48°42'	86°25'	6°14' "	" "
48°44'	86°47'	5°34' "	" "
48°45'	87°27'	2°42' "	" "
48°44'	87°48'	4°52' "	" "
44°36'	87°52'	5°41' "	Lake Survey, United States.
48°48'	88° 2'	4°52' "	Admiral Bayfield.
48°37'	88° 5'	4°52' "	" "
48° 8'	88°40'	5°37' "	" "
48°18'	89°14'	6°37' "	" "
48°24'	89°14'	6°37' "	" "
47°45'	90°25'	7°52' "	" "

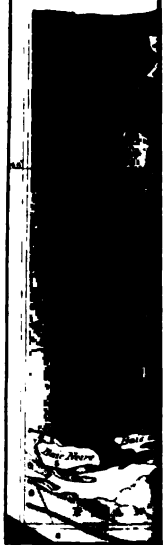


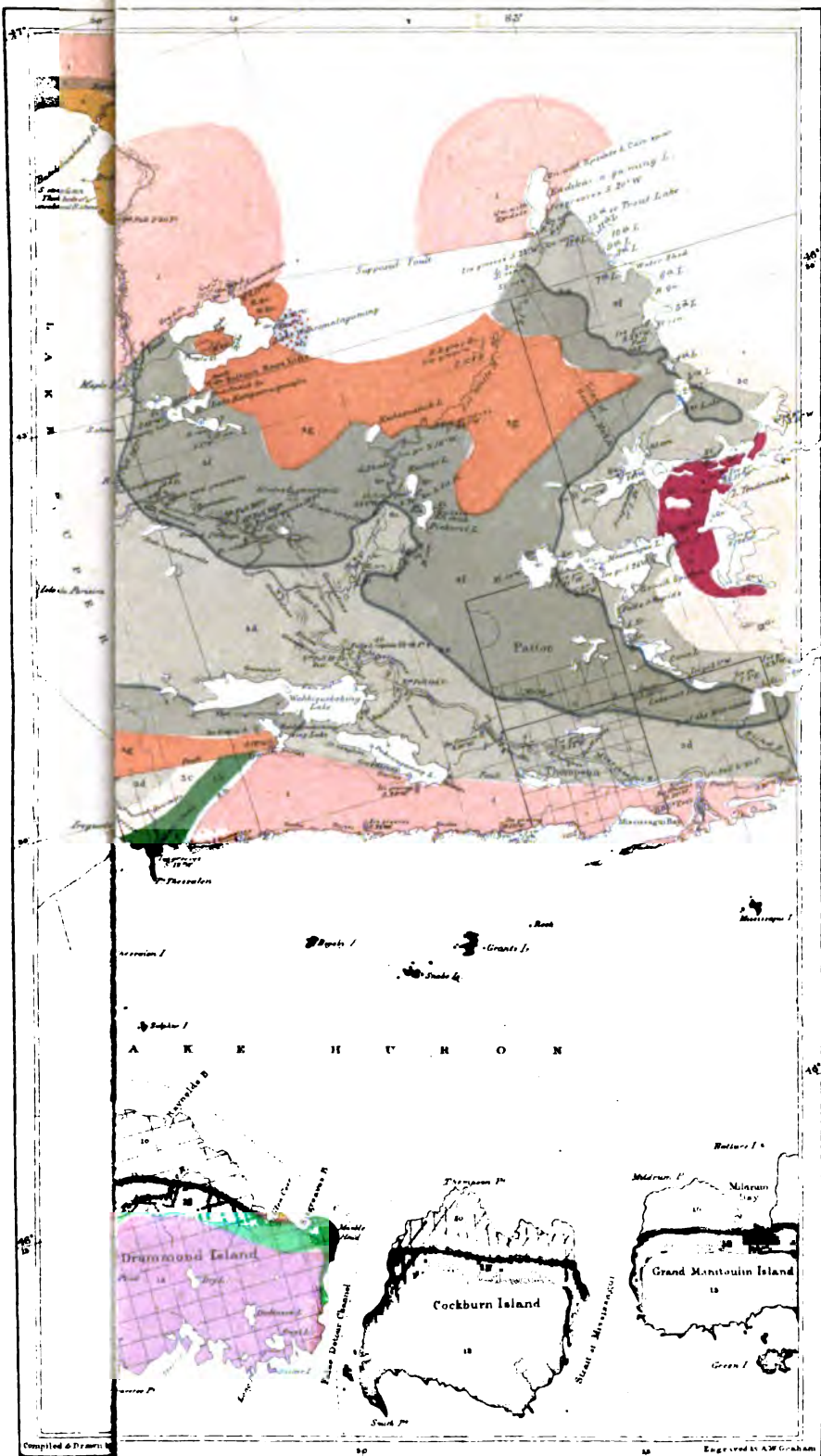




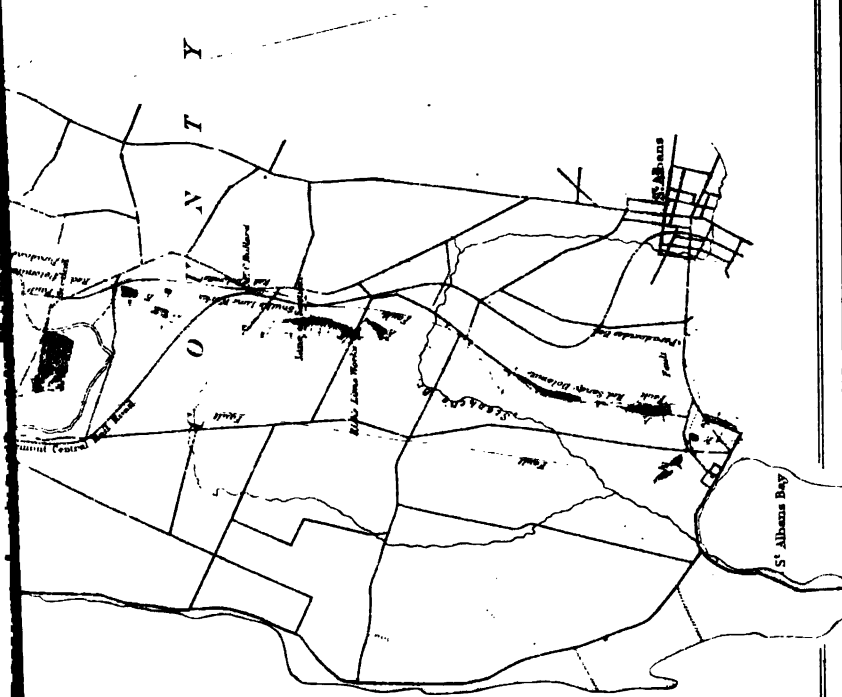
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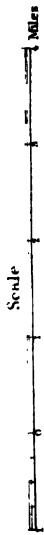


LAKE CHAMPLAIN



GEOLOGICAL SURVEY OF CANADA
Sir W.E. Logan F.R.S. Director.

MAP
Showing the distribution of
ROCKS BELONGING TO THE
POTSDAM QUEBEC & TRENTON GROUPS
on the East side of
LAKE CHAMPLAIN
in the neighbourhood of the line between
CANADA EAST AND VERMONT.

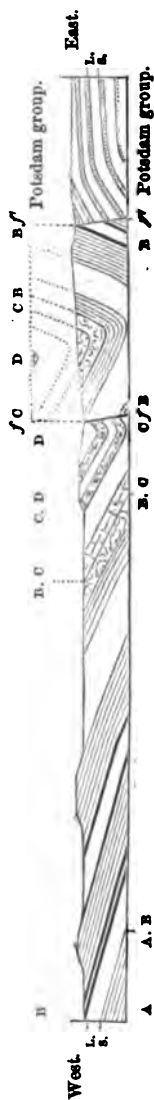


EXPLANATION OF THE COLORS AND SIGNS

- Trenton
- Quebec
- Potsdam
- Black conglomerates and limestones D-C
- White and dove gray limestones B-A-E
- Sandstone
- Dip and inverted dip
- Strike of beds

IVA.

1.—SECTION ON THE TWENTY-NINTH LOT OF ST. ARMAND.



L, level of Lake Champlain; s, sea level. The letters A, B, C, D refer to the divisions of the Quebec group, as given on page 844 of the Geology of Canada; f and f' mark two faults or dislocations, the latter bringing up the Potsdam group. This, and the four sections following, are on a horizontal and vertical scale of three miles to an inch.

2.—SECTION ON THE PROVINCE LINE, EASTWARD FROM LAKE CHAMPLAIN.



L, level of Lake Champlain; s, sea level. A, B refer to the divisions of the Quebec group as above; f, f', fault; f'', approximate position of the break or overlap bringing up the Potsdam group. The asterisks mark the iron posts of the boundary-line between Vermont and Canada, and a the place of the Rock River.

IVB.

3.—SECTION AT HIGHGATE SPRINGS, VERMONT.



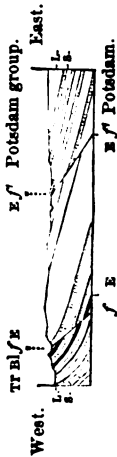
L, level of lake; *s*, sea level; Δ , lowest division of the Phillipsburgh series (Geology of Canada, page 844); Σ , the Chazy formation, with the dove-grey limestones at its base; ibid page 854; *bl*, Black River formation; *tr*, Trenton formation; *v*, Utica formation; *f*, proximate place of fault. The portion from *x* to *z* is concealed.

4.—SECTION NEAR TO SWANTON FALLS, VERMONT.

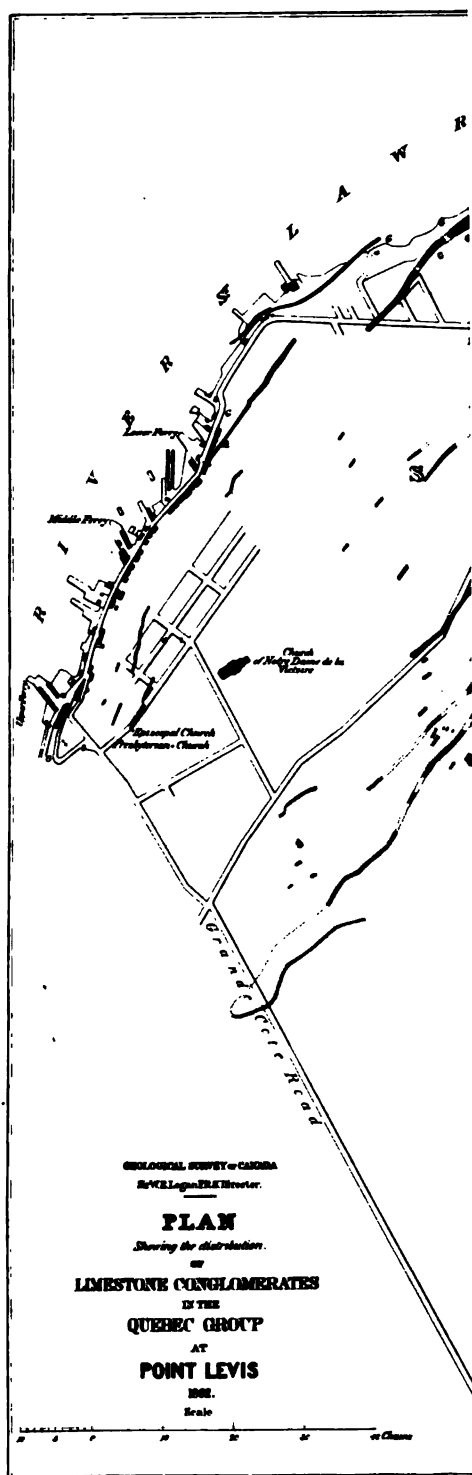


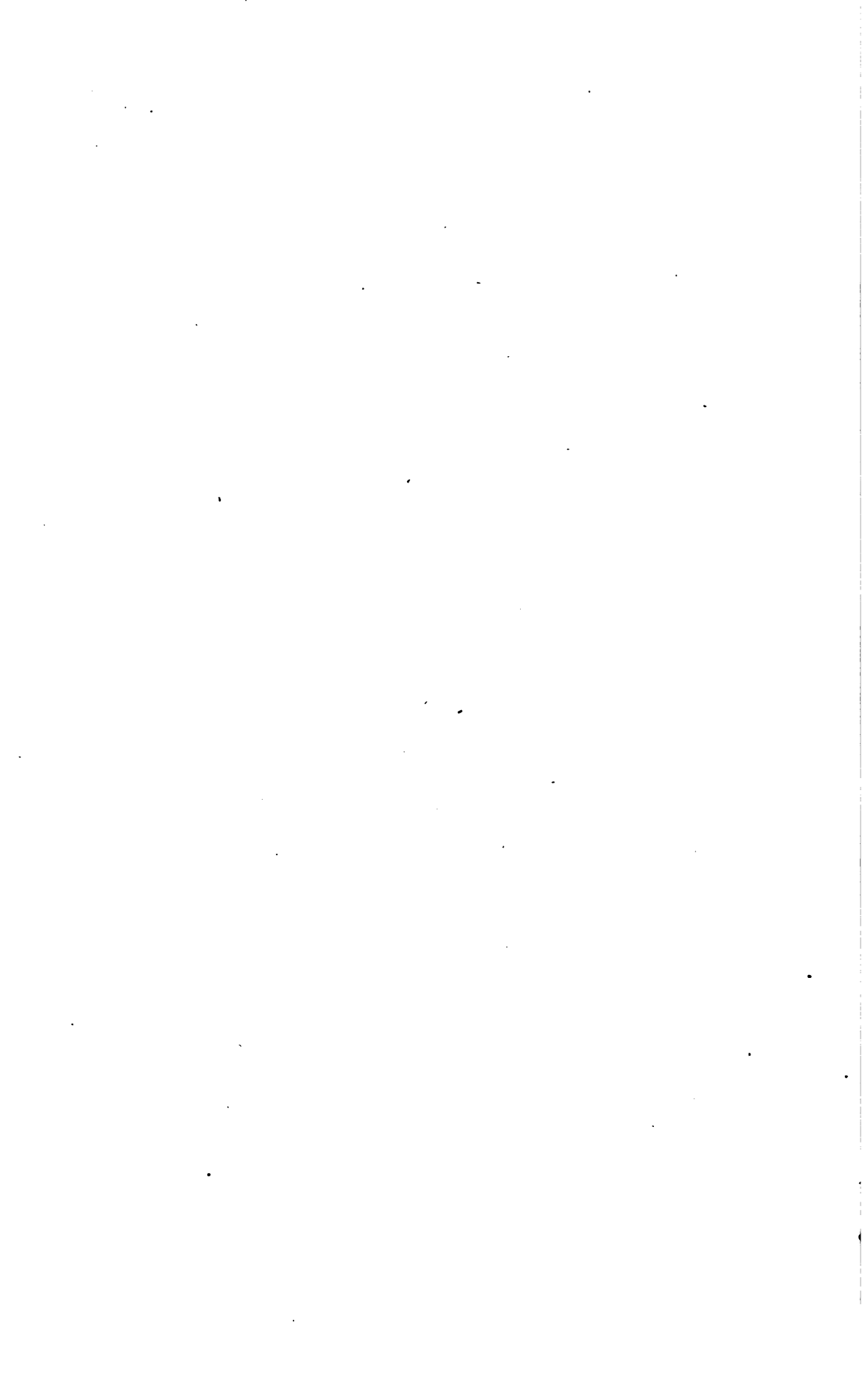
L L, level of Lake Champlain; s s, sea level; m m, Chazy formation, with underlying strata, as on page 855 of the Geology of Canada; f f, the break or overlap bringing up the Potsdam group; m, the Missisquoi River.

5.—SECTION AT SMITH'S LIME-WORKS IN SWANTON, VERMONT.



ll, level of Lake Champlain; ss, sea level; m, Chazy formation, with the lower dove-grey limestones, as in section 3; bl, Black River formation; tr, Trenton formation; ff, fault; ff', the break or overlap bringing up the Potsdam group.



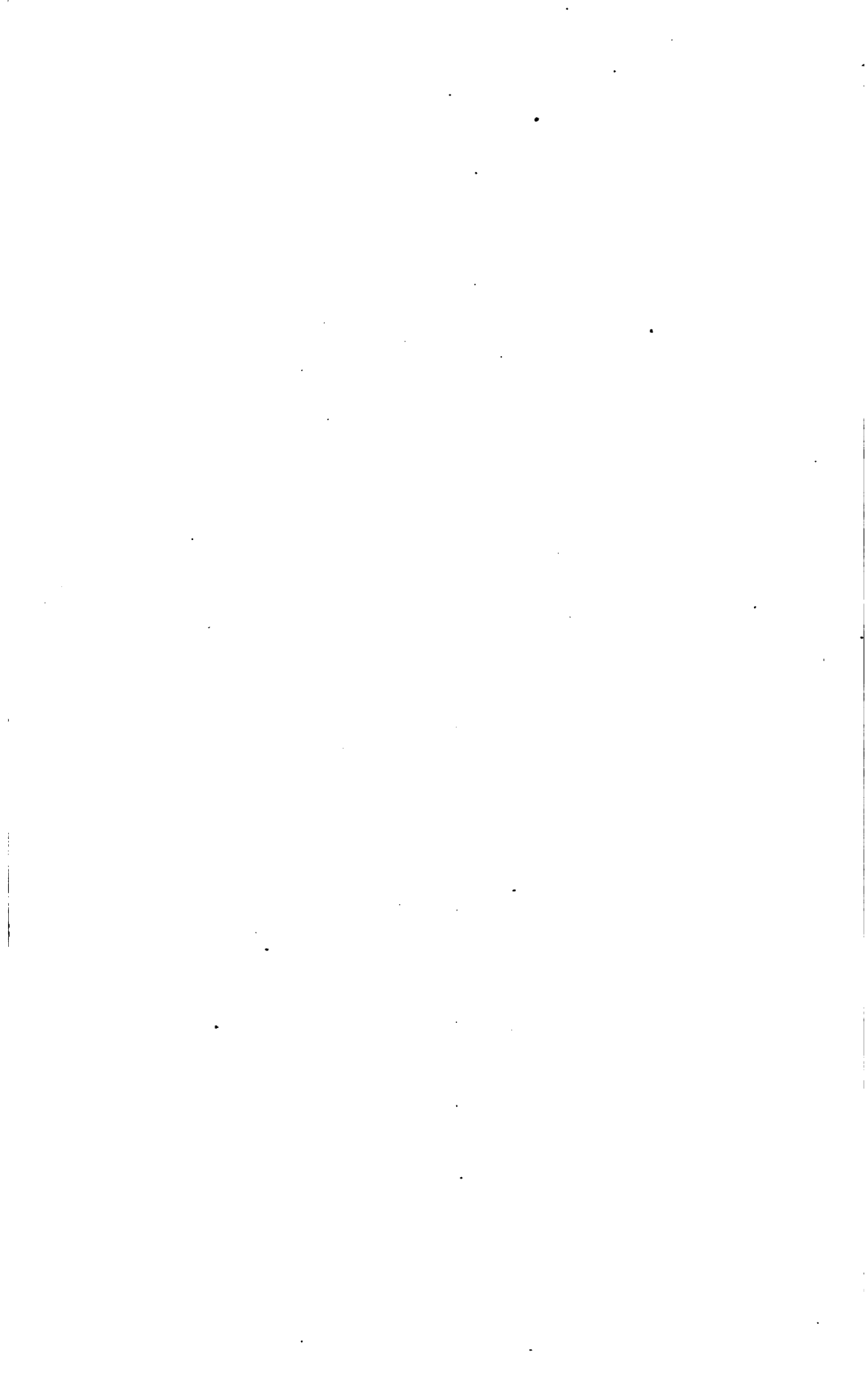


SECTION ON THE NORTHEAST LINE OF THE FIRE STE. ANNE, POINT L'EVIS.

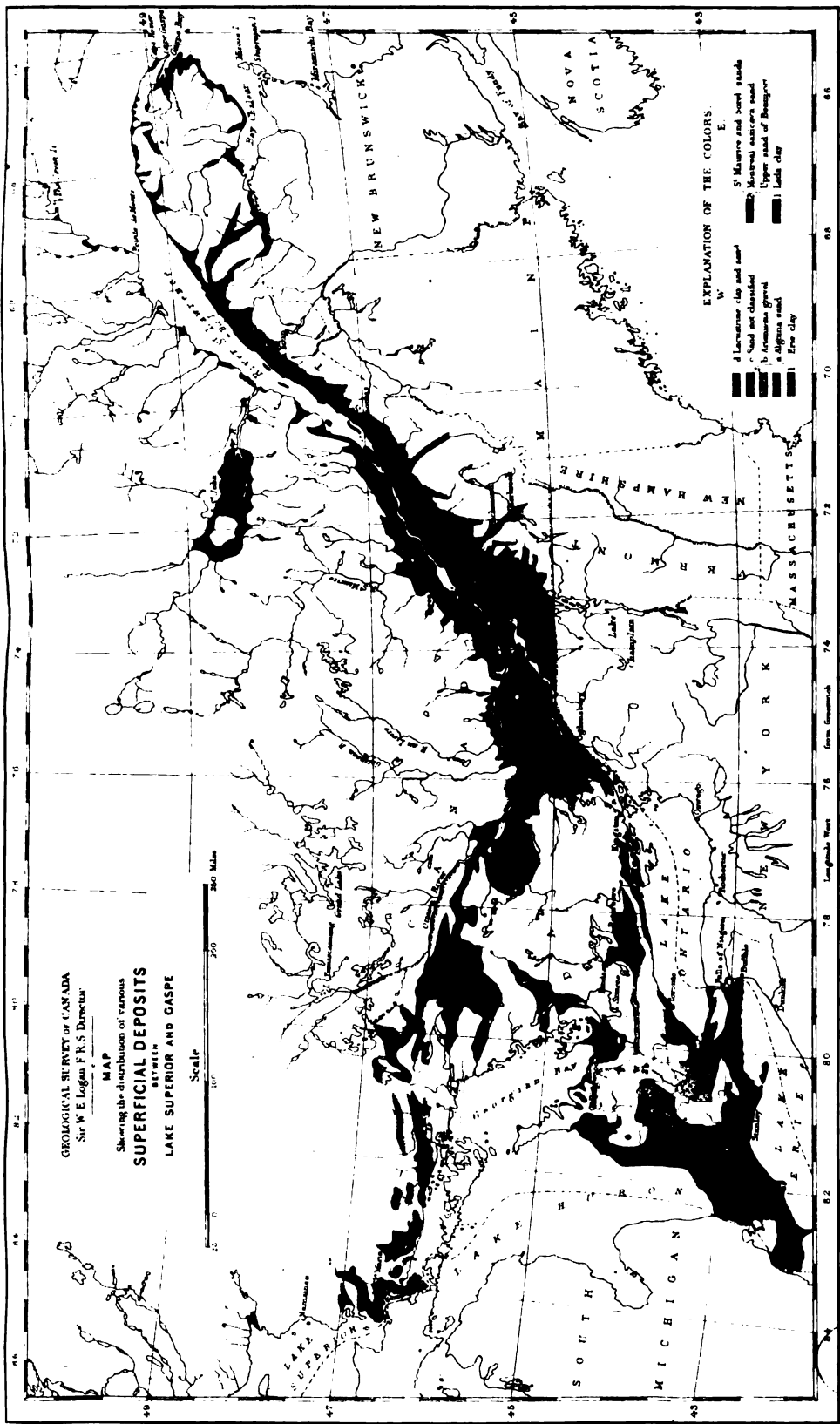


Horizontal and vertical scale, three inches to one mile.

Level of the sea; c, Coast ridge; n, North ridge; m, Middle ridge; s, South ridge; r, Roads; d, 1, 2, 3, 4, 5, 6, 7, 8, 9, bands of conglomerate. The strata from a to a' belong to the divisions 1-10 of the Orleans section (*Geology of Canada*, p. 227); those from b to b' represent divisions 11 and 12; those from c to c' divisions 13-16, and those of d the base of division 17, all of the same section. The red dotted lines above show the position of certain of the beds before denudation, and those beneath the present subterranean connection of some of the same beds.



MAP
Showing the distribution of various
SUPERFICIAL DEPOSITS
BETWEEN
LAKE SUPERIOR AND GASPE



T I N

F O

S.

W.

U.S.

New York

ke Ge

uron

Presque Isle

B a y

Huron, Canada W.

INDEX

Fault
L. Huron



g Red quartzite
f Upper slate conglomerate
e Limestone
d Lower slate conglomerate
c White quartzite
Greenstone
i Gneiss

Huronian

Laurentian

Stanford's Geographical Establishment London.

LUSTRI

da W

Clarke

Niagara

McKean

Olean Creek

Allegany R.

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miterous & Oriskany
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Carboniferous
Devonian
Upper Silurian
Middle Silurian



20 Hudson River
9 Utica
8 Trenton
7 Birdseye & Black-river } Lower Silurian
6 Chazy } Quebec
5 Calcevirous }
4 Potsdam
1 Oness
Laurentian

Can

A

Track Bed
'(unaccredited)'

Grand Trunk R?

How Island

R. St. Lawrence

R. St. Lawrence

White Island

R. St. Lawrence

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INDEX

Clinton
Medina
Onondaga
Hudson-river
Utica
Trenton
Birdseye & Black-river
Chazy
Calcevirous
Potsdam
Oness

Middle Silurian
Lower Silurian
Quebec
Laurentian

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10	Hudson-river	
9	Utica	
8	Trenton	
7	Birdseye & Black-river	Lower Silurian
6	Chazy	
5	Calceolarius	
4	Potsdam	
1	Green limestone &c.	Laurentian

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Island of Montreal

R. St. Lawrence

Laprairie

R. des Prairies

C. de St. Catherine

Mount Royal

Canal
Grand Trunk Rly.

river

Labrador

gneiss
fossiliferous
gneiss

le

INDEX

10	Hudson-river	
9	Utica	
8	Trenton	
7	Birdseye & Black-river	Lower Silurian
6	Sillery (Chazy)	Quebec
5	Calceolarius	
4	Potsdam	
3	Anorthosite	Labrador
2	Limestone	Upper Laurentian
1	Anorthosite	
	Greenstone	Intrusive

R. Richelieu

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15

10

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1.5 on

Three Rivers & Arthur Lakes R.

INDEX

11 Medina	Middle Silurian
10 Hudson-river	
9 Utica	
8 Trenton	
7 Birdseye & Black-river	
6 Silvery - (Chazy)	Lower Silurian
5 Calciferous	Quebec
4 Potsdam	
1 Gneiss	Laurentian

ouis

St

to th

West Branch
G. Casapichua R.

INDEX

22 Bonaventure	Carboniferous
19 Gaspé sandstones -	Devonian
17 Chamung	
16 Oriskany	
16 Cape Gaspé limestones - Lower Helderberg	Gaspé limestones
15 Port Daniel limestones - Onondaga	Upper Silurian
12 Chateaufort limestones - Clinton	Middle Silurian
6 Silvery - Chazy	Lower Silurian
5 Calciferous	Quebec
1 Tertiary granitic	Intrusive

Island

Gulf of St. Lawrence

S. W. Point
L'Anse-au-Loup

Douglas

Chamung	Carboniferous
Oriskany	Devonian
Gaspé limest.	Lower Helderberg
Anticosti	Onondaga (Ludlow)
Medina	Upper Silurian
	Middle Silurian
	Lower Silurian
	Laurentian

